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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Applicant's arguments filed 20 April 2009 have been fully considered but they are not persuasive.

Applicant argues that Rowan University has conducted a successful test replicating and validating Black Light Power's 1000 watt and 50,000 watt reactors, Black Light Power being applicant's company, where "only one percent (1%) of the heat generated could be accounted for by previously known chemistry." This is not persuasive because the interaction between hydrogen and Raney nickel (used in applicant's reactors, as shown in Attachment 3 to applicant's paper of 20 April 2009, and in Attachment 2, page 11) is known to produce a highly exothermic recombination of hydrogen atoms released from its surface, after being chemisorbed thereto. See <http://rabett.blogspot.com/2008/12/something-strange-comes-this-way-well.html> and the links thereof. The article's calculations are as follows:

To do this right we would have to know the heat of formation of a mole of H atoms on the Raney nickel and a whole lot of details, Raney nickel is a very nano material, where structure is everything. However, for the back of our envelope we can use bond strengths from the table in the Chem Rubber Bible (aka Chemical Rubber Company Handbook of Chemistry and Physics, 9-64 (2008)).

Ni-Ni: 204 kJ/mol
Ni-H: 240 kJ/mol
H-H: 436 kJ/mol

So we break two Ni-H bonds, that costs us 480 kJ/mol and we make one Ni-Ni bond getting back 204 kJ/mol and one H-H bond, getting back 436 kJ/mol

Net heat of reaction is estimated by adding the energies for the bonds broken and subtracting the energies for the bonds formed. (A negative number means the reaction will be exothermic or give off energy in the form of heat)

Net heat of reaction per mole of H₂ generated = $2 \times 240 \text{ kJ/mol} - 436 \text{ kJ/mol} - 204 \text{ kJ/mol} = -160 \text{ kJ/mol}$ (an exothermic reaction)

Net heat evolved from 1.5 kg of Raney nickel = $(6.7\text{-}10.0 \text{ mol}) \times -160 \text{ kJ/mol} = -1072 \text{ kJ to } -1600 \text{ kJ} = -1.1 \text{ to } -1.6 \text{ MJ!!}$

Thus, applicant's anomalous heat is accounted for by conventional chemistry.

Applicant argues that the heat produced by his reactors would mean that they have utility. This is not persuasive because the present claims recite "lower-energy" hydrogen. While heat *per se* is useful, it is the alleged source of the heat that would not be useful.

Applicant argues that "Classical Physics gives closed-form solutions of the hydrogen atom, the hydride ion, the hydrogen molecular ion, and the hydrogen molecule and predict corresponding species having fractional principal quantum numbers." This is not persuasive because "classical physics", which is normally understood to be physics before the conception of Quantum Mechanics and Relativity, does not account for the internal structure of atoms. In classical physics, two oppositely charged particles would be attracted to each other, and then cling together after contact. Two opposite magnetic poles would be a macroscopic example. Classical physics, as normally understood, does not account for integral principal quantum numbers, let alone applicant's theorized fractional principal quantum numbers.

Applicant argues that energy transferred from a hydrogen atom to a catalyst is necessary to equal energy difference between the hydrogen's initial and final states, because first there is a nonradiative resonant energy transfer to the catalyst and then the remaining energy is released. This is not persuasive because it implies a transfer of a given quantity of energy between an object (the catalyst) that may accommodate the amount, and an object (the hydrogen atom) that cannot. Furthermore the value of $q=5$, which applicant does not observe (See, for example, Attachment 112, submitted with the IDS of 13 February 2006) is predicted by applicant's equations, even when energy transferred to the catalyst is taken into account. In going from $p=3$

to $p=4$ (or a principal quantum number theoretically going from $1/3$ to $1/4$), the overall difference in energy would be $1/(1/4)^2 - 1/(1/3)^2$, or $1/(1/16) - 1/(1/9)$, or $16 - 9$, or $q=7$. If an amount of $q=2$ is first transferred to the catalyst, the remaining amount should be $q=5$, which is not observed.

Please see also the attached Appendix C.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is 571-272-1286. The examiner can normally be reached on Mon-Fri 8:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Stephen J. Kalafut/
Primary Examiner, Art Unit 1795

APPENDIX C

From GUT/Eq.1.1:

$$\text{Eq. 1.1: } \nabla^2 \rho - (1/r^2) [\partial^2 / \partial t^2] \rho = 0$$

$$\text{With } \nabla^2 = (1/r^2) [\partial / \partial r [r^2 \partial / \partial r]] + (r^2 \sin \theta)^{-1} [\partial / \partial \theta [\sin \theta \partial / \partial \theta]] + (r^2 \sin^2 \theta)^{-1} [\partial^2 / \partial \varphi^2]$$

$$\text{Eq. 1.9: } \rho(r, \theta, \varphi, t) = f(r) \cdot A(\theta, \varphi, t) = \\ = (1/r^2) \delta(r-r_n) \cdot A(\theta, \varphi, t) = (1/r^2) \delta(r-r_n) \cdot Y(\theta, \varphi) \cdot k(t) \dots \text{from line below Eq. 1.48}$$

Insert into $\nabla^2 \rho$:

$$\nabla^2 \rho = A(\theta, \varphi, t) \cdot (1/r^2) [d/dr [r^2 d/dr] f(r) + f(r) \cdot \{ (r^2 \sin \theta)^{-1} [d/d\theta [\sin \theta d/d\theta]] + (r^2 \sin^2 \theta)^{-1} [d^2/d\varphi^2] \} A(\theta, \varphi, t)]$$

From Eq. 1.58 and 1.60 (eliminating $\hbar^2/2I$):

$$\{ (\sin \theta)^{-1} [d/d\theta [\sin \theta d/d\theta]] + (\sin^2 \theta)^{-1} [d^2/d\varphi^2] \} A(\theta, \varphi, t) = l(l+1) A(\theta, \varphi, t)$$

$$\text{Thus, } \nabla^2 \rho = A(\theta, \varphi, t) \cdot (1/r^2) [d/dr [r^2 d/dr] f(r) + f(r) \cdot (1/r^2) \cdot l(l+1) \cdot A(\theta, \varphi, t)]$$

From Appendix B (attached, for example, to the Office Action of 31 December 2007 of Ser. No. 09/813,792), point 4, the derivation of the Dirac delta function $\delta(r-r_n)$ is made according to Powell & Craseman, *Quantum Mechanics*, Addison Wesley Publ. Co., Inc., Reading MA - London UK (1961), page 482; see also the derivation at the end of this Appendix:

$$[d/dr] \delta(r-r_n) = - (r-r_n)^{-1} \cdot \delta(r-r_n)$$

$$[d/dr] f(r) = [d/dr] (1/r^2) \delta(r-r_n) = - (2/r^3) \cdot \delta(r-r_n) - (1/r^2) \cdot (r-r_n)^{-1} \cdot \delta(r-r_n)$$

$$[r^2 d/dr] f(r) = - (2/r) \cdot \delta(r-r_n) - (r-r_n)^{-1} \cdot \delta(r-r_n) = - \{ 2r^{-1} + (r-r_n)^{-1} \} \cdot \delta(r-r_n)$$

$$d/dr [r^2 d/dr] f(r) = + (2r^{-2} + (r-r_n)^{-2}) \cdot \delta(r-r_n) + \{ 2r^{-1} + (r-r_n)^{-1} \} \cdot (r-r_n)^{-1} \cdot \delta(r-r_n)$$

$$(1/r^2) [d/dr [r^2 d/dr] f(r)] = 2r^{-2} \cdot \{ (r^2 + [r^{-1}(r-r_n)]^{-1} + (r-r_n)^{-2} \} f(r)$$

Insert this into $\nabla^2 \rho$:

$$\nabla^2 \rho = A(\theta, \varphi, t) \cdot f(r) \cdot [2r^{-2} \{ (r^2 + [r^{-1}(r-r_n)]^{-1} + (r-r_n)^{-2} \} + (1/r^2) \cdot f(r) \cdot l(l+1) \cdot A(\theta, \varphi, t)]$$

$$= A(\theta, \varphi, t) \cdot f(r) \cdot (1/r^2) \cdot [2 \cdot \{ (r^2 + [r^{-1}(r-r_n)]^{-1} + (r-r_n)^{-2} \} + l(l+1)]$$

Thus, it is now obvious that

$$\nabla^2 \rho - (1/r^2) [\partial^2 / \partial t^2] \rho = A(\theta, \varphi, t) \cdot f(r) \cdot (1/r^2) \cdot [2 \cdot \{ (r^2 + [r^{-1}(r-r_n)]^{-1} + (r-r_n)^{-2} \} + l(l+1)] \neq 0$$

The first term includes a non-vanishing function of r , but the second term includes the angular momentum eigenvalue $l(l+1)$ that is not, and can not be shared or cancelled out by the radial function of the first term. (Note, this is fully different than in conventional Quantum Mechanics, in which the radial wave function contains Laguerre polynomials, $L_{k, l+1/2}(t)$, thus enabling the Schrödinger equation be satisfied, because both the radial and angular parts of the equation contain the eigenvalue l !

In other words, Applicant's charge density $\rho(r, \theta, \varphi, t) = f(r) \cdot A(\theta, \varphi, t)$ is not a solution of Eq. 1.1.

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**This means, Applicant's radial function $(1/r^2)\delta(r-r_n)$ is NOT a valid postulate !
Hence, Applicant's bubble shell model of electron density is a FALLACY, and so is also the entire GUT/CQM and the hydrino theory.**

RIGOROUS DERIVATION OF THE FIRST DERIVATIVE OF THE DELTA FUNCTION

Following Appendix B, paragraph 4, line 8:

The integral representation of the Dirac delta function (Powell *et al.* ref. [6] pg.480, Eq.A4-6):

$$\begin{aligned}
 \delta(r-r_n) &= (1/2\pi) \cdot \int \exp is \cdot (r-r_n) \cdot ds \\
 d/dr [\delta(r-r_n)] &= (i/2\pi) \cdot \int s \cdot \exp is \cdot (r-r_n) \cdot ds \\
 &= (i/2\pi i \cdot (r-r_n)) \cdot \{s \cdot \exp is \cdot (r-r_n) |_{(-\infty) \rightarrow +\infty} - \int \exp is \cdot (r-r_n) \cdot ds\} \\
 &= (1/(r-r_n)) \cdot (1/2\pi) \cdot \{0 - \int \exp is \cdot (r-r_n) \cdot ds\} \\
 &= (1/(r-r_n)) \cdot (1/2\pi) \cdot \{- \int \exp is \cdot (r-r_n) \cdot ds\} \\
 &= (1/(r-r_n)) \cdot \delta(r-r_n)
 \end{aligned}$$